



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/631,251	07/31/2003	Ching-Chen Hao	TSM03-0521	1589
43859	7590	12/22/2004	EXAMINER	
SLATER & MATSIL, L.L.P. 17950 PRESTON ROAD, SUITE 1000 DALLAS, TX 75252			LUK, OLIVIA T	
			ART UNIT	PAPER NUMBER
			2812	

DATE MAILED: 12/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/631,251

Applicant(s)

HAO ET AL.

Examiner

Olivia T. Luk

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. Claims 1, 4-8, and 16-19 are rejected under 35 U.S.C. 102(a) as being anticipated by Kunikiyo (6,465,335) B1.

In re claim 1, Kunikiyo discloses forming a structure on a wafer (col. 7, lines 5-12), the structure having a first layer and a mask layer (col. 7, lines 13-30), the first layer having a layer formed of pre-doped polysilicon (col. 7, lines 13-20) and, oxidizing the wafer creating an oxidized layer prior to removing the mask layer (col. 9, lines 55-65); and removing the oxidized layer (col. 9, lines 60-65).

In re claim 4, Kunikiyo discloses the pre-doped polysilicon is pre-doped with a material selected from the group consisting essentially of phosphorous, nitrogen, arsenic, and antimony (col. 7, line 17).

In re claim 5, Kunikiyo discloses the structure is a gate structure and includes an insulator layer (col. 7, lines 7-12).

In re claim 6, Kunikiyo discloses the insulator layer is formed of a material selected from the group consisting essentially of oxide, silicon dioxide, and combinations thereof (col. 7, lines 7-12).

Art Unit: 2812

In re claim 7, Kunikiyo discloses oxidizing is performed by rapid thermal oxidation (RTO) (col. 10, lines 15-20).

In re claim 16, Kunikiyo discloses forming a polysilicon layer on the substrate (col. 7, lines 13-15); pre-doping the polysilicon layer (col. 7, lines 15-22); forming a mask layer on the polysilicon layer (col. 7, lines 28-30); etching the mask layer, the polysilicon layer, and the gate oxide (col. 7, lines 40-60); oxidizing the wafer creating an oxidized layer (col. 10, lines 15-20); and removing the mask layer and the oxidized layer (col. 10, lines 45-60).

In re claim 17, Kunikiyo discloses pre-doping is performed with a material selected from the group consisting essentially of phosphorous, nitrogen, arsenic, and antimony (col. 7, line 17).

In re claim 18, Kunikiyo discloses the polysilicon layer formed on an insulator layer is formed of a material selected from the group consisting essentially of oxide, silicon dioxide, and combinations thereof (col. 7, lines 7-12).

In re claim 19, Kunikiyo discloses oxidizing is performed by rapid thermal oxidation (RTO) (col. 10, lines 15-20).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2812

4. Claims 2, 3, 8, 9, 20, 21, 23, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kunikiyo (6,465,335) B1.

In re claims 2, 3, 23, and 24, Kunikiyo is applied as above, but fails to specifically teach the first layer is about 1500 Å to about 2500 Å in thickness; or 1800Å. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have had the first layer at about 1500 Å to about 2500 Å in thickness, or 1800Å, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

In re claims 8 and 20, Kunikiyo is applied supra, and teaches RTO but fails to disclose the RTO is performed at a temperature about 900° C to about 1010° C. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have had the first layer at about 1500 Å to about 2500 Å in thickness, or 1800Å, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

In re claims 9 and 21, Kunikiyo is applied supra, and teaches RTO but fails to disclose the RTO is performed for about 5 seconds to about 15 seconds. It would have been obvious to one having ordinary skill in the art at the time the invention was made to, since it has been held that where the general conditions of a claim are disclosed in the

Art Unit: 2812

prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

5. Claims 10-15, 22, and 25-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kunikiyo (6,465,335 B1) in view of Quek et al. (6,417,056 B1).

In re claims 10 and 22, Kunikiyo is applied as above, and teaches removing the mask layer, but fails to teach removal is by wet dip in phosphoric acid. Quek et al. teaches a gate structure with polysilicon and a mask, further teaching removing the mask layer by a wet dip in phosphoric acid. It would have been obvious to one having ordinary skill in the art at the time the invention was made to remove the mask layer by a wet dip in phosphoric acid, since it the wet dip will remove substantially more of the mask than a dry etch.

In re claims 11 and 25, Kunikiyo is applied as above and teaches a silicon oxynitride (SiON) layer, but fails to teach the mask layer includes a plasma-enhanced oxygen (PEOX) layer. Quek et al. teaches a gate structure with polysilicon and a mask, further teaching the plasma-enhanced oxygen (PEOX) layer (col. 3, lines 28-32). It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a plasma-enhanced oxygen (PEOX) layer instead of the LPCVD formed layer since it is well known in the art that either method is widely used.

In re claims 12, 13, 26 and 27, Kunikiyo in view of Quek et al. are applied supra, but fail to specify ranges of 200-300 Å or 260 Å in thickness for the PEOX layer. It would have been obvious to one having ordinary skill in the art at the time the invention

Art Unit: 2812

was made to, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

In re claims 14, 15, 28 and 29, Kunikiyo is applied supra, but fail to specify ranges of about 100-200 Å or about 150 Å in thickness for the SiON layer. It would have been obvious to one having ordinary skill in the art at the time the invention was made to, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. References not applied are considered state of the art in the area of semiconductor manufacture.

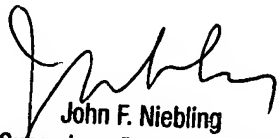
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Olivia T. Luk whose telephone number is 571-272-1676. The examiner can normally be reached on 8AM to 5PM Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling can be reached on 571-272-1679. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2812

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

OTL
December 15, 2004


John F. Niebling
Supervisory Patent Examiner
Technology Center 2800